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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/596,181
Filing Date: June 02, 2006
Appellant(s): SUDOL, WOJTEK

Gregory L. Thorne
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 10/20/08 appealing from the Office action mailed 08/07/08.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

None.

(3) Status of Claims

The status of claims is correct.

(4) Status of Amendments After Final

There are no Amendments after final.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The Appellant's statements are correct.

(7) Claims Appendix

The listing of claims is correct.

(8) Evidence Relied Upon

US-2006/0150380 07-2006 Ossman

US-5,655,276 08-1997 Pattanayak et al.

US-5,920,523 08-1997 Hanafy et al.

US-2003/0018267 01-2003 Erikson et al.

US-2003/0032884 02-2003 Smith et al.

US-6,416,478 07-2002 Hossack et al.

US-4,571,520 02-1986 Saito et al.

JP-06-09050 04-1994 Odaka et al.

JP-60-113597 06-1985 Inoue

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 4, 5, 8, 12, 15, 16 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erikson et al. (2003/0018267). Erikson et al. show (fig. 5) an ultrasound transducer probe, comprising: an attenuation backing substrate (23); an integrated circuit (32) coupled to the attenuation backing substrate (23), wherein the integrated circuit (32) is translucent to acoustic waves (see paragraph [0048]); and an array of piezoelectric elements (18) coupled to the integrated circuit (32); the array of piezoelectric elements (18) having an acoustic matching layer (30, see claim 7) disposed on a first surface of the array thereof.

The integrated circuit (32) includes a thickness sufficiently small for causing the integrated circuit to be translucent to acoustic waves. See paragraph [0047].

The thickness of the integrated circuit (32) is on the order of approximately 50 μm. See paragraphs [0047] and [0049] in which it is noted that the thickness aspect of the integrated circuit is the same as that of the silicon layer.

The array of piezoelectric elements (18) includes a one-dimensional array (as shown).

Erikson shows a method of fabricating an ultrasound transducer probe, comprising: providing an attenuation backing substrate (23); coupling an integrated

circuit (32) to the attenuation backing substrate (23), wherein the integrated circuit (23) is translucent to acoustic waves, as noted above; and coupling an array of piezoelectric elements (18) to the integrated circuit (32); the array of piezoelectric elements (18) having an acoustic matching layer (30) disposed on a first surface of the array (18) thereof.

The integrated circuit (23) includes a thickness sufficiently small for causing the integrated circuit (23) to be translucent to acoustic waves, as noted above.

The thickness of the integrated circuit (23) is on the order of approximately 50 μm, as noted above.

The array of piezoelectric elements (18) includes a one-dimensional array, as noted above.

Erikson et al. do not specifically state that the thickness of the integrated circuit is less than 50 μm.

Erikson et al. clearly teach the desirability and advantage of having an acoustically translucent IC and the achievement of such by making the component thin. Therefore it would have been obvious to one of ordinary skill in the art to achieve even greater acoustic translucence by having the IC component thinner than 50 μm. Thinness in this instance is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide for an IC component in the device of the Applicants' invention, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the

optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Claims 2, 9, 11, 13 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erikson et al. (2003/0018267). Given the invention of Erikson et al. as noted above, they do not note the attenuation allowed by their backing material. Note however that the applicants do not disclose in these claims what material is employed.

It would have been obvious to one having ordinary skill in the art to employ an attenuation backing substrate includes a material capable of providing an attenuation on the order of approximately 10 dB/cm at 5 MHz to 50 dB/cm at 5 MHz since it has been held to be within the skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Claims 3, 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erikson et al. (2003/0018267) further in view of Odaka et al. (JP 06-090950). Given the invention of Erikson et al. as noted above, they do not show an ultrasonic transducer array which *inter alia* has an attenuation backing substrate that includes epoxy composite materials that consist of epoxy and a mixture of very high and very low acoustic impedance particles.

Odaka et al. note a backing member for an ultrasonic probe that has areas of low and high impedance. He doesn't note his specific material.

It would have been obvious to one having ordinary skill in the art to have high and low impedance sections in the backing of an ultrasonic probe device in order to

better focus the beam, as is taught by Odaka et al. in their PURPOSE. Regarding the material or materials chosen for such a backing, it has been held to be within the skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Claims 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erikson et al. (2003/0018267) further in view of Ossmann (US 2006/0150380). Given the invention of Erikson et al. as noted above, they do not show note that their integrated circuit includes at least one of a silicon based, a gallium based, and a germanium based integrated circuit or an integrated circuit that solely includes a silicon based integrated circuit.

Ossmann shows (fig. 2) and notes (paragraph [0085]) a silicon base integrated circuit (110) for use in an ultrasound probe array assembly.

Ossmann does not note that the integrated circuit is translucent to acoustic waves.

It would have been obvious to use a silicon base integrated circuit in the device or Erikson et al. at the time of their invention, such as is clearly taught by Ossmann, since the properties of silicon based integrated circuits are well known and thus have a predictable operation.

Additionally, it would have been obvious to one having ordinary skill in the art to use any of a silicon, gallium or germanium based intergrated circuit since these are all well known materials for integrated circuit construction and since it has been held to be within the skill of a worker in the art to select a known material on the basis of its

suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Claims 7 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Erikson et al. (2003/0018267) further in view of Pattanayak et al. (US 5,655,276). Given the invention of Erikson et al. as noted above, they do not show a two-dimensional array.

Pattanayak et al. note that an ultrasound array can either be one or two dimensional for similar applications and that either arrangement is typical. See col. 1, lines 15-20.

Pattanayak et al. do not note a specific integrated circuit, or a backing with low and high impedance particles.

It would have been obvious to one having ordinary skill in the art to form the Erikson et al. invention into a two-dimensional array since such is noted as typical and since both one and two-dimensional arrays may serve similar purposes as Pattanayak et al. note.

Additionally, it would have been obvious to one having ordinary skill in the art to make the Erikson et al. array into a two-dimensional array, *mutatis mutandis*, since it has been held that mere duplication of the essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8.

(10) Response to Argument

The Appellant notes at page 12, that "Erickson does not suggest that thinning down generally leads to more transparency of the IC as suggested in the Final Office

action". In response, in paragraph [0047] of the Erickson reference, he notes "Integrated circuit **32** conforms to the description of interposed substrate **40** of **FIG. 6**., with regard to thickness and acoustical properties by thinning the substrate to less than a wavelength and preferably less than half of the wavelength of the center frequency, and thus becomes essentially acoustically transparent ...". So Erickson does suggest that there is a clear relationship to transparency and the thinness of the integrated circuit.

The Appellant, in response to the Examiner's contention that a relationship between IC thinness and transparency is taught by Erickson, notes at the top of page 13, lines 1-4 that, "It is interesting to note that while the Final Office Action makes this assertion, it cites no sections of Erikson for supporting this allegation." He goes on to note in that paragraph beginning on line 5 that, "Erickson merely suggests that the prior art technology is capable of thinning an IC to 50 μm, yet in fact suggests a more suitable figure to be on the order of 210-420 μm (see, page 4, paragraph [0049])". In response, paragraph [0047] does note the relationship between thinness of the integrated circuit and transparence as noted above. Additionally, in paragraph [0049] Erickson notes "This range of thickness is well within the within the state of the art in silicon thinning. For example, there is available equipment that plasma polishes silicon down to 50 μm". Thus there is a suggestion in Erickson here that it is within a routineer's skill to make a layer thin and that that skill requires available equipment. Given that the thinness to achieve transparency is noted by Erickson, the Examiner contends that it is

obvious to consider a range less than 50 μm, such as that suggested by the Applicant, if the available equipment exists, as Erickson notes.

The Appellant notes at page 13, starting at line 7, that Erickson teaches away from the range claimed by the Applicant and notes that this is obvious in figures 6 and 7. While the Examiner does not dispute that, the Examiner contends that he relies on Erickson for teaching a relationship between thinness and transparency of the integrated circuit.

The Appellant indicates in page 13, starting at line 14, that *In re Aller* is not properly applied because in the *in re Aller* ruling "the ranges disclosed by Aller were particularly close to the ranges claimed", while those in Erickson are not close to the claimed range. In response, the suggestion exists by Erickson that thinness and transparency are related and this has been formerly noted (in paragraph [0047]), and also that given proper equipment to make a layer thin, it is within the skill of one of ordinary skill in the art to do so (in paragraph [0049]). The Examiner maintains that this makes the claimed range a consideration obvious by that person of ordinary skill. Additionally, in paragraph [0047] Erickson notes that "A thinned IC also facilitates the use of conventional ultrasound transducer designs, including an acoustically attenuating backing structure **23**, which are well known in the ultrasonic transducer art". This together with his teachings from figures 6 and 7, point to consideration of a thickness range, and testing such ranges, to achieve the desired output as in agreement with the essence of *In re Aller*.

The Appellant cites *In re Oetiker, In re Piasecki, In re Fine and In re Geisler,* in the first complete paragraph of page 14 to line 3 of page 15. The citation of these rulings is to show that the Examiner hasn't shown a *prima facie* case of obviousness as they indicate is required since the Examiner hasn't shown "that some objective teaching in the prior art or knowledge generally available to one of ordinary skill in the art ...". The Appellant notes that "If the examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of non-obviousness". In response, the Examiner notes that Erickson teaches finding the best thickness for his components and this is clear in figures 6 and 7. So a teaching exists to find such for a routineer in the art, including the Applicant. Erickson also teaches in paragraph [0047] that it is known that the thinness of the layer is directly related to its transparency, thus a teaching exists that if transparency is a consideration, then so is a consideration of the thinness of the layer. Erickson also teaches that it is desirable to have a transparent layer because it can be omitted in calculations in paragraph [0048], specifically in the calculations of figure 8.

In the first complete paragraph of page 15, the Appellant stresses the point that Erickson teaches away from the "presently claimed invention" and that "There is no suggestion to modify a prior art reference where the modification would render the device inoperable for its intended purpose (*In Re Gordon*)". Further that reducing thickness causes "increased reflectivity and therefore renders Erikson inoperable for its intended purpose." In response, the test employed by the Examiner is whether it would be obvious to one of ordinary skill in the art to make an Integrated Circuit less than 50

μm in a device like Erickson's, given the teachings of Erickson in the above cited paragraphs. The Examiner's conclusion is yes for the reasons cited in this response to the Appellants' remarks.

Additional remarks by the Appellant refute the Advisory Action allegation that the Appellant has ignored the Final Office Action reference to Erikson, paragraph [0048]. Where it is stated that "This extremely thin layer is also acoustically transparent and could be neglected in the calculations for FIG. 8". This argument is moot because a review of the Applicant's arguments in the After Final Amendment of 7/22/08 has not resulted in this argument being specifically addressed.

The Appellant then summarizes his arguments on pages 16 and 17. The Examiner's counter arguments are described above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Thomas M. Dougherty/ Primary Examiner, Art Unit 2834

Thomas M. Dougherty

November 18, 2008

Conferees:

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